TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE · · FOREST SERVICE

No. 439

Development of Closely Spaced Red Pine, White Pine, and Norway Spruce After 40 Years

In 1910, approximately 20 acres of 2-0 seedlings were set out at intervals of about 6 inches in rows located 2.5 feet apart near Lovells, in northern Lower Michigan. The area was abandoned after transplanting, leaving the red pine, white pine, and Norway spruce to develop as best they could. Portions of the plantation have been thinned, but other parts have remained relatively undisturbed. There is an opportunity now to appraise the comparative effects of extreme close spacing on the growth and development of these three species on a uniform site.

The site is a level area of gravelly sand (Rubicon, gravelly phase) which originally supported red and white pines. The site quality is estimated to be medium for red pine. The stumps were removed in order to establish the transplant beds.

In 1951, 41 years after being established as transplant beds, nine 1/100-acre sample plot measurements in the unthinned portion of the plantation revealed the following stand conditions:

Item	In area occupied by--		
	Red pine	White pine	Norway spruce
Living trees per acre.....Number..	7,998	8,134	5,200
Basal area per acre.....Square feet..	190	182	121
Diameter average tree.....Inches..	2.1	2.0	2.0
Average diameter of dominant trees.....Inches..	3.5	3.4	2.6
Average height of dominant trees.....Feet..	29	29	23
Number of dominant trees.....Percent of total..	12	12	40
Dead trees standing per acre.....Number..	2,000	8,133	10,400

On this particular site the growth and development of red and white pines have been almost identical. Also, natural pruning has not been very successful for any of the three species. Dead branches are less persistent on the red pine than on the white pine or spruce, but branch stubs still persist after nearly 40 years of extreme close spacing.

Norway spruce has failed to keep up with the red and white pines in the unthinned portions of the stand. Damage to the spruce by rabbits has been severe.

Along the edge of the plantation both the height and the diameter growth of the three species have been about the same.

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MAINTAINED AT ST. PAUL 1, MINNESOTA, IN COOPERATION WITH THE UNIVERSITY OF MINNESOTA